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PRODUCTION

Editor's Comments

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Crops improved in many parts of the province with the rainfall and showers during the first half of July. Although the cool, dry spring had a negative effect on emergence and development in some regions, it is still very important to check and protect the crop, especially considering the current high prices.

REMEMBER TO FOLLOW PRE-HARVEST INTERVAL GUIDELINES WHEN APPLYING CROP PROTECTION PRODUCTS.

Pre-harvest intervals (PHI) must be followed to ensure the maximum residue levels are not exceeded in the harvested crop. The PHI is the number of days that must pass between the last application of a pesticide and harvest. Harvest is defined as the cutting of the crop or the removal of the product from the plant. This includes direct combining, cutting (swathing) or grazing; it does not include combining swaths or baling for hay. Refer to the crop protection product label or the product information in the *2008 Guide to Crop Protection* for more information on specific PHIs.

If you are a Bertha armyworm trap co-operator, please remember to forward your land locations and weekly counts to Sean Miller, toll-free, at 1-888-323-7842 or fax (306) 787-0428, so that your site can be entered into the map (see Bertha Armyworm Update).

Saskatchewan Ministry of Agriculture's *Weekly Crop Report* can be seen at:
www.agriculture.gov.sk.ca/Crop-Report

NOTE: Throughout this document, you will see that some publications are in blue font and underlined, indicating links to website information. If you are reading this off your computer screen, press the CTRL button and click your cursor on the link to take you directly to the website. ☼

Crop Production News is a biweekly publication prepared primarily by provincial specialists with the Crop Development Branch of the Saskatchewan Ministry of Agriculture. The newsletter includes a compilation of articles related to entomology, plant pathology, weed science, soils and agronomy issues.

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If you wish to be added to or removed from our mailing list, forward your request by email to:
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Crop Protection Lab Update

By Grant Holzgang, Supervisor, Crop Protection Laboratory

Cereals:

White heads and white tips are now occurring in wheat as a result of a number of causes. Wheat stem maggot (*Myromyza americana*) is one of the easiest causal agents to identify based on symptoms. If the white head easily pulls out of the sheath and chewing/tunneling injury is apparent, the problem is wheat stem maggot. It is rarely of great significance, but the amount of injury is often over-estimated because the white heads are very apparent. Common root rot/prematurity blight (*Cochliobolus sativus*, *Fusarium* spp.) can result in partial or full white head. Affected plants show brown staining of the subcrown internode, roots, crown and/or basal parts of the stems. Take-all root rot (*Ophiobolus graminis*) can have the same effect, but it causes a much darker discolouration – usually black – and occurs much less frequently than common root rot. Pesticides may cause partial or total white head if they are inappropriately applied or if there has been drift. Moisture deficiency can also result in white head and unthrifty plants that often have tillers sloughed off. Excessive heat at time of flowering is also a common cause of partial white heads, usually resulting in white tip. Wind and hail resulting in mechanical injury to the head or stem can also be included in this list of common causes of white head.

Tan spot (*Pyrenophora tritici-repentis*) on wheat and net blotch (*Pyrenophora teres*) on barley appear to be the most common foliar infections at this time. Levels are light to moderate, based on specimens submitted to the lab.

The recent rains during cereal flowering have increased the risk of head blight (*Fusarium* spp.).

Samples of head smut (*Ustilago* spp.) have been submitted. Seed treatment with one of the registered fungicides is effective in preventing this problem.

Pulses:

Anthraxnose (*Colletotrichum truncatum*) is the most common disease on lentils based on submissions (Figure 1). Stem lesions with fully developed acervuli are present, and most infections seen to date are in the lower third of the canopy. Some infections are reaching the severe level. When spraying fungicides to control this disease, good penetration into the lower canopy is important. Ascochyta blight (*Ascochyta lentis*) and Sclerotinia stem rot (*Sclerotinia sclerotiorum*) have also been noted in lentil crops.



Figure 1: Anthracnose lesions on lentils.
Source: Crop Protection Laboratory.

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Crop Protection Lab Update (Continued from page 2)

Septoria leaf blotch (*Septoria* sp.) on lentils was recovered from a stem lesion. Root rot of soybean (*Fusarium* spp., *Rhizoctonia* sp.) has been submitted from southeastern Saskatchewan.

Caraway: Ascochyta blight (*Ascochyta* sp.) and aster yellows have been noted. Ascochyta blight can spread rapidly under wet conditions and severely affect yields. Aster yellows, vectored by leaf hoppers, usually only affect a small portion of the plants but, because caraway is grown as a biennial, it has more time to spread throughout the crop.

Greenhouse pepper: Botrytis (*Botrytis cinerea*) and Fusarium soft rot (*Fusarium* sp.) are usually related to poor air flow and high humidity. This is the first time Fusarium soft rot has been identified by the lab, but it has been seen previously in Alberta. We are in the process of positively identifying the Fusarium species involved.

Strawberries: Crown/root rot (*Cylindrocarpon*, *Fusarium*, *Pythium*, *Rhizoctonia* spp.) has significantly affected production and plant vigour. It is often related to poor soil conditions, and can follow winter injury. ☼

Bertha Armyworm Map and Economic Thresholds Update

By Scott Hartley, Provincial Specialist, Insects and Vertebrate Pests

The 2008 Bertha armyworm pheromone trapping program will be completed the week of August 4. The cool temperatures in May and June resulted in delayed emergence of the adult Bertha armyworm moths from their over-wintering pupal stage. Few moths were trapped prior to the last week in June this year. The majority of Bertha armyworm moths were collected in the first two weeks of July.

The Bertha Armyworm Risk Map is posted on the Saskatchewan Ministry of Agriculture website. A new, revised map will be posted every week until mid-August. Mid-July captures suggest there are high risk areas in the northeast, north of Tisdale, and in other pockets near Saskatoon and Regina. Remember to check the pre-harvest interval for the insecticide being applied.

There are a number of factors that influence the effectiveness of the insecticides in controlling armyworms, including environmental (e.g. temperature), chemical rates, water volumes and the location of the pest within the crop. Due to the higher market value of canola this year, lower economic thresholds must be considered when evaluating infestations. See the updated economic thresholds for Bertha armyworm in Table 1.

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Bertha Armyworm Map and Economic Thresholds Update (Continued from page 3)

Factors:

- **Environment:** High temperatures can cause problems during application. Label recommendations suggest that application of synthetic pyrethroids (e.g. Decis, Matador) should be avoided if temperatures are above 25°C. It should be noted that, for better contact, all insecticide control measures should be taken in the evening as the larvae will be more actively feeding up in the crop.
- **Location of the pest within the crop:** If the armyworms are not feeding towards the top of the crop canopy, contact with an insecticide will be less likely. Therefore, monitoring the numbers of larvae present as well as noting their habits will be important in determining the timing of control. Although the pests can be controlled through the ingestion of residual insecticides on the plant surfaces, this is not taking advantage of the contact mode of action.
- **Correct application rates and water volumes are important:** The general rule where a range in rates is stated is that higher rates should be used when dealing with high populations of the larger, dark, more advanced stages of larvae. Using higher water volumes will provide better coverage and control with the insecticide.

Update on Economic Thresholds for Bertha Armyworm

Bertha armyworm thresholds can vary based on the expected price of canola and the cost of insect control (insecticide and application cost). Due to the increase in the value of canola this year, the Canola Council of Canada led an effort to expand the Bertha armyworm economic threshold table. ✪

Table 1: Bertha Armyworm Thresholds in Canola

Spraying Cost - \$/acre	Expected Seed Value - \$/bushel										
	6	7	8	9	10	11	12	13	14	15	16
Number of Larvae/metre ²											
7	20	17	15	13	12	11	10	9	9	8	8
8	23	20	17	15	14	13	11	11	10	9	9
9	26	22	19	17	16	14	13	12	11	10	10
10	29	25	22	19	17	16	14	13	12	11	11
11	32	27	24	21	19	17	16	15	14	13	12
12	34	30	26	23	21	19	17	16	15	14	13
13	37	32	28	25	22	20	19	17	16	15	14
14	40	35	31	27	24	22	20	19	17	16	15
15	43	37	32	29	26	23	22	20	19	17	16

Source: Manitoba Agriculture, Food and Rural Initiatives

Swathing versus Straight Combining Barley and Oat

By Blaine Recksiedler, Provincial Specialist, Cereal Crops

Standard recommendations for swathing versus straight combining barley and oat do not exist. Generally, time and quality management, available equipment and personal preference will determine whether or not producers swath or straight combine. However, the trend to increased straight combining will continue.

General advantages of swathing:

- Protection against shattering. This is particularly true for crops with a higher tendency to shatter, such as six-row barley and oat.
- Swathing can hasten dry-down, given proper drying conditions in the swath. Terminating plant growth can result in a shorter time interval to harvest. This can be beneficial on rolling land with uneven maturity, since producers may not want to risk shattering losses while they wait for later maturing areas to dry down.
- Terminates under-storey growth (late flushes of tillers, volunteers and weeds).
- Offers the opportunity to create a double swath to better utilize combine capacity.
- Offers a strategy to deal with lodging.

The advantages of straight combining are generally related to time and quality management, especially during wet fall conditions.

General advantages of straight combining:

- Protection against sprouting and staining. Most malting barley varieties are susceptible to sprouting, especially two-row varieties.
- If the grain is tough, it will dry faster in the head than in the swath, resulting in better quality and shorter time to harvest.
- Heavy dews have less negative effect on standing grain quality.
- One operation; however, if areas of the field are still green, producers may harvest around these areas, resulting in additional trips to the field.

Oat is somewhat susceptible to shattering, so to maximize grain plumpness and test weight, minimize percentage of green kernels, and reduce the risk of weathering in the swath, the crop should be left standing as long as possible. In fact, some producers will let the crop shatter a bit before cutting.

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Swathing versus Straight Combining Barley and Oat (Continued from page 5)

The top kernels on the oat panicle tend to shatter first, and are among the last to fill on the panicle. These florets tend to produce smaller kernels, so allowing them to shatter may improve overall sample quality. This delay will also provide the opportunity for any wild oat to begin to shatter, since wild oat generally shatters before tame oat. The appearance of shattering may seem more serious with an oat crop as compared to other cereal crops. For instance, a one-per-cent shattering loss in oat, with its higher yield and larger, easy-to-see kernels, will be more visually evident than the same level of loss with wheat or barley. ☼

Managing Crop Residues at Harvest

By Ken Panchuk, Provincial Specialist, Soils

Chopping and spreading straw and chaff uniformly is a critical first step in any zero-till or min-till seeding system. Proper straw management at harvest allows for ease of seeding the next crop, and also improves soil moisture conservation. Further improvement in moisture conservation and moisture use efficiency can be made



Figure 1: Redekop Straw Chopper
Source: Redekop

by adopting tall stubble technology. This is especially effective in the Brown and Dark Brown soil zones, where moisture is often limiting. Leaving the stubble tall, plus uniformly chopping and spreading the crop residue, followed by seeding directly into the tall stubble optimizes the moisture use efficiency.

Fine-cut straw choppers are now the standard in the industry, allowing the chopped straw and chaff to be spread uniformly over the width of the cut. These high performance choppers require periodic maintenance to be able to effectively handle a wide variety of crop types under variable harvest conditions. Keeping the flails and knives in good condition assures that the straw chopper will do the job effectively and efficiently. This is particularly important for hard-to-chop crop residues like flax.

Upgrading to the self-sharpening option will greatly extend the life of the straw chopper wear parts and reduce down time during the harvest rush.

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Managing Crop Residues at Harvest

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Some producers in the more moist areas of Saskatchewan are experimenting with a new straw management system. This system uses a straight cutting header or stripper-header that leaves the stubble tall. Then, between harvest and seeding, a specially designed rotary mower is used to chop and spread the stubble to facilitate seeding. The system allows flexibility in the timing of residue management – in the fall if soil moisture recharge is adequate, or in the spring to allow the tall stubble to collect snow for extra moisture recharge. ☼

Incidence of Root Rot in Pea

By Faye Dokken, Provincial Specialist, Plant Diseases

Seed rot, root rot, damping-off, seedling blight and wilt of pea are most often caused by the very common species of *Fusarium*, *Pythium*, *Rhizoctonia* or *Aphanomyces*. These pathogenic fungi are primarily seed- and soil-borne, and may cause disease individually or in combination with other pathogens. Like many plant diseases, the symptoms often show when the plants are stressed.

Several cases of root rot have been reported in pea crops this year. Concerned farmers and agronomists have observed wilting, stunting and yellowing of foliage in patches throughout the field (Figure 1), along with poor nodulation and decaying of roots. Samples have been submitted to the Crop Protection Lab recently, and the issue is being investigated further to confirm the cause of the problem.

A possible explanation is that cool conditions earlier this spring inhibited nodulation by nitrogen-fixing rhizobia, resulting in nitrogen deficiency. Under these conditions, and in combination with additional moisture-related stresses (very dry or very wet), pea plants were more susceptible to infection by root rot pathogens. Crop rotations of four to five years with non-legumes will reduce inoculum levels, but will not eliminate the potential for root rot in the future, especially under similar environmental conditions.

Stay tuned for more information on root rot of pea crops in Saskatchewan. ☼



Figure 1: Root rot in pea.
Source: Saskatchewan Agriculture

Hail Increases Opportunity for Plant Diseases

By Faye Dokken, Provincial Specialist, Plant Diseases

Many parts of the province were hit recently by devastating hail storms which flattened some crops and injured others that may yet be salvageable. As farmers anxiously wait to see if their crops recover, it's important to keep in mind that the situation could worsen if diseases are able to take advantage of the vulnerable plants.

Remember, hail predisposes crops to disease in three ways:

1. Hail causes wounding of plant tissues, creating an entry point for pathogens. Most fungal pathogens have specialized structures that allow direct penetration of plant tissues, but wounding will facilitate infection. Bacterial pathogens require this type of opening to cause disease.
2. Plants become stressed and maturity is delayed, subjecting the crop to a longer period of susceptibility to disease, as well as increasing risk to frost injury.
3. Heavy rain and wind accompanying hail can facilitate disease spread and development. Plants are also more likely to lodge, which allows disease to spread faster. High humidity is favourable for spore production and infection.

There are a few ways to distinguish between the symptoms of hail damage and disease:

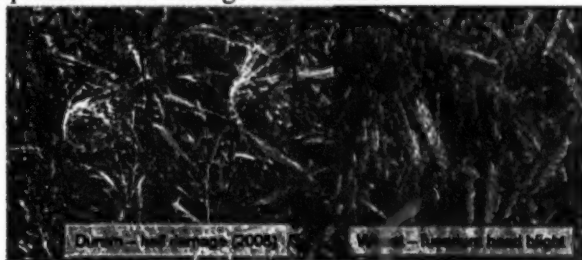


Figure 3: Hail damage (left) and disease infection (right) on durum wheat.

Source: Saskatchewan Agriculture



Figure 1: Hail damage (left) and disease infection (right) on chickpea. Source: Saskatchewan Agriculture and Disease of Field Crops in Canada



Figure 2: Hail damage (left) and disease infection (right) on lentil. Source: Saskatchewan Agriculture

- Shredding, bruising or callusing on one side of the plant suggests hail damage (Figures 1 and 2).
- Other signs of physical damage caused by hail include broken stems, defoliation, kinked heads, split pods and general bleaching or necrosis (Figure 3).

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Hail Increases Opportunity for Plant Diseases

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- Formation of a canker with a distinct margin and discolouration suggests disease (Figures 1 and 2).
- Other signs of pathogen presence include defined lesions, pustules, mycelium, spores, fruiting bodies such as pycnidia, and survival structures such as sclerotia (Figures 1 and 2).
- Hail damage will occur throughout the field and is not selective – weeds, neighbouring crops, grass and plants outside of the field will also be affected.
- Diseases are often very host-specific and are more likely to occur in patches, with symptoms spreading from focal points in the field.

Nothing can be done to prevent or cure hail damage, but steps to manage diseases can be taken as long as the crop still has the yield potential to cover the cost of the control method. In general, the earlier the crop stage when the damage occurs, the more potential there is for recovery, and also the more worthwhile it is to protect. Consult the *Guide to Crop Protection* for more information on fungicide options and timing. ☼

Staging Pre-harvest Glyphosate in Uneven Crops

By Clark Brenzil, Provincial Specialist, Weed Control

With the dry conditions at seeding time, followed by significant late spring rainfall, many 2008 crops had two emergence dates that could be as much as two or three weeks apart. Progress over the growing season has closed this gap, but there could still be mature and green crop in the same field as we approach harvest.

Pre-harvest glyphosate applications are made to control weeds. The recommended staging is “after the physiological maturity of the grain has been reached.” Glyphosate labels and the *Guide to Crop Protection* have detailed descriptions of the proper staging for application to each registered crop. The reasons for applying at this stage include:

- *Preventing excessive herbicide residue in the seed.* Prior to physiological maturity, the seed is actively taking in sugars and other compounds in the plant. During this time, glyphosate applied to the plant will also be moved into the seed, potentially raising residue levels in the grain. After physiological maturity has been reached, movement to the grain is minimized.
- *Maximizing harvestable yield and minimizing shrivelled seed.* Biological processes in the crop stop within a day or two after glyphosate application. If this occurs before the seed is mature, filling of the seed also stops. If seed filling is terminated prematurely, the proportion of shrivelled seeds increases, and test weight and yield decline.

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Staging Pre-harvest Glyphosate in Uneven Crops (Continued from page 9)

This year, producers need to consider the option of waiting for uneven cereal crops to mature completely before applying pre-harvest glyphosate. This is because cereals are less prone to shattering and lodging than other crops.

Indeterminate crops, such as pulses, are more likely to shatter or lodge. The lower pods of indeterminate crops often produce the most yield and mature first. In this case, producers should choose an application timing where most pods have matured beyond the recommended minimum stage, but before the lower pods are shattering.

Glyphosate will not speed up seed fill. Glyphosate kills the plant and stops seed fill shortly after it is applied. Glyphosate application will not prevent frost damage to the seed. If applied prematurely, glyphosate can cause more damage and yield loss than the frost it was intended to protect against. ☼



For information about submitting samples to Saskatchewan Agriculture's Crop Protection Lab, go to www.agriculture.gov.sk.ca/ (Programs & Services > Crop Protection Lab Services); Or phone (306) 787-8130.

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